



BURLINGTON INTERNATIONAL AIRPORT

September 21, 1994

Mr. Chuck Schwer, Supervisor
Agency of Natural Resources
Hazardous Materials Management Division
103 South Main St./West Office
Waterbury, Vermont 05671-0404

RE: Site Investigation Report - Site #93-1503
Burlington International Airport Innotech Fuel Farm

Dear Mr. Schwer,

As requested in your letter of January 3, 1994, Burlington International Airport retained the services of a qualified environmental consultant, Groundwater of Vermont, located in Burlington and has completed an initial site investigation of the Innotech fuel farm area. A copy of the Groundwater report for the fuel farm site is enclosed for your use.

Upon review of the report we would appreciate your assessment of the extent of the contamination, your assessment of the report's conclusions and guidance or suggestions you might have regarding the recommendations.

We have also provided a copy of this report to Innotech Aviation for their information and review.

If you have any questions, please contact Bob McEwing at 863-2874.

Sincerely,

John J. Hamilton
Director of Aviation

AIP21/CONTAM/ANR9



INITIAL SITE INVESTIGATION REPORT

**Burlington International Airport
Fuel Farm**

VT DEC Site #93-1503

18 June 1994

Prepared for:

Burlington Airport Commission
1200 Airport Drive, #1
South Burlington, VT 05403

Prepared by:

Ground Water of Vermont
1 Mill Street, Box C-5
Burlington, Vermont
(802) 860-6065

GWV Project #V94-011

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	
1.0. INTRODUCTION	1
1.1 Scope of Work	
1.2 Site Location and Physical Setting	
2.0. SITE HISTORY	2
2.1 Petroleum Storage History	
2.2 Previous Investigation Results	
3.0. INVESTIGATIVE PROCEDURES AND RESULTS	4
3.1 Soil Gas Survey	
3.2 Determination of Ground Water Flow Direction and Gradient	
3.3 Ground Water Sampling and Analysis	
3.4 Free Product Recovery	
3.5 Site Inspection	
4.0 SOURCE AREA DISCUSSION	7
4.1 Main Fuel Transfer Area and Abandoned UST	
4.2 Innotech #1 and #2 USTs	
4.3 Former BP ASTs and Innotech #7 UST	
5.0 RECEPTOR SURVEY AND RISK ASSESSMENT	9
6.0 CONCLUSIONS	10
7.0. RECOMMENDATIONS	11

APPENDIX A - FIGURES AND TABLES

Figure 1.	Site Location Map
Figure 2.	Site Plan
Figure 3.	Ground Water Contour Map - 27 April 1994
Figure 4.	Ground Water Contaminant Distribution Map - 27 April 1994
Figure 5.	Free Product Recovery Data
Figure 6.	Soil Gas Contaminant Distribution Map - 25-27 April 1994
Table 1.	Ground Water Elevation Calculations
Table 2.	Soil Gas Results

APPENDIX B- SOIL GAS SAMPLING PROTOCOLS

APPENDIX C - LABORATORY REPORT FORMS

EXECUTIVE SUMMARY

Ground Water of Vermont (GWV) has conducted an initial site investigation at the Burlington International Airport Fuel Farm in South Burlington, Vermont. The investigation consisted of the following: 1) a review of available data on the site; 2) a soil gas survey; 3) sampling and analysis of ground water and petroleum product in existing monitoring wells; 4) four weekly bailings of free product from a monitoring well in the fuel farm; 5) a site inspection; 6) a receptor survey and risk assessment; and 7) preparation of a summary report.

The investigation has identified soil and ground water petroleum contamination in two areas of the site. The soil gas results suggest that there are two distinct plumes of petroleum compounds. The larger of the soil-gas plumes appears to have originated from spills in the main fuel transfer area and/or releases from a nearby abandoned underground storage tank (UST) of unknown history. A smaller soil-gas plume was identified in the northern portion of the site, between the former location of two above ground storage tanks owned by British Petroleum and the active Innotech #7 UST. The source of this contamination was not determined. Observations of petroleum staining and odors in soils beneath the aboveground piping system for the Innotech #1 and #2 Jet-A fuel USTs, combined with the presence of nearly one foot of Jet-A fuel in an adjacent monitoring well (MW1), suggests that petroleum has been released to the subsurface from these systems.

Ground water gradient at the site was determined to be toward the southwest, at 0.1%. The presence of free product in two of the three monitoring wells may have interfered with the accurate determination of ground water flow direction. The low gradient is due to the topographic location of the site in the middle of a broad, flat topographic high area. Monitoring results from the three monitoring wells at the site indicate the presence of 0.90 feet of free-phase petroleum product identified as jet fuel in monitoring well MW1 (located adjacent to the Innotech #1 and #2 USTs), 0.04 feet of free product in MW2 (located adjacent to an abandoned UST of unknown history), and dissolved petroleum compounds above Vermont drinking water standards in MW3 (located between the former BP AST locations and the Innotech #7 UST).

Approximately 1.8 gallons of jet fuel were recovered from monitoring well MW1 by manual bailing in four weekly events. Recovery data trends suggest that there is not a large volume of easily recoverable product in the vicinity of this well. Monitoring well MW2 did not contain enough product to warrant recovery efforts.

On the basis of these findings, GWV recommends that additional monitoring wells be installed at the site, to better evaluate the degree and extent of dissolved and free-phase petroleum contamination at the site. Data obtained from the additional monitoring wells will be used to determine whether a Corrective Action Feasibility Study is warranted. GWV recommends the installation and weekly operation of a filter canister-type passive recovery system for continued product recovery from monitoring well MW1, and monthly monitoring of the other monitoring wells at the site. Product recovery should be performed by OSHA-trained personnel. The two abandoned USTs at the site should be permanently closed in accordance with State regulations. Regulatory compliance of current fuel handling and release reporting practices should be verified.

1.0 INTRODUCTION

This report details the results of a site investigation at the Burlington International Airport Fuel Farm in South Burlington, Vermont. The report has been prepared by Ground Water of Vermont (GWV) for the Burlington Airport Commission.

The site investigation has been conducted to fulfill requests made by Mr. Chuck Schwer of the Vermont Department of Environmental Conservation (VT DEC) Sites Management Section (SMS) in a 3 January 1994 letter to the airport director, Mr. John Hamilton. The VT DEC requested that additional work be conducted at the site after receiving a report entitled "Results of a Preliminary Field Investigation at the Burlington International Airport for the City of Burlington, VT". The report, prepared by Burns and McDonnell Waste Consultants, Inc. of Overland Park, Kansas, indicated that subsurface petroleum contamination was present in soils and ground water at the fuel farm site. The VT DEC requested the following actions:

1. Actively recover any free product measured in the ground in excess of 1/8";
2. Further define the degree and extent of contamination to the soil;
3. Perform an additional round of ground water samples from the three on-site monitoring wells;
4. Determine the need for additional monitoring wells at the site in order to define the degree and extent of petroleum contamination;
5. Determine the need for a long-term treatment or monitoring plan for the site; and
6. Submit to the SMS a summary report outlining the work performed and providing conclusions and recommendations.

GWV submitted a preliminary work plan and cost estimate to the VT DEC on 25 February 1994. The VT DEC approved the work plan and cost estimate on 16 March 1994.

1.1 Scope of Work

To accomplish the investigation objectives, GWV has performed the following:

- Reviewed existing data on the site;
- Performed a soil gas survey at the site;
- Determined ground water flow direction and gradient;
- Collected and submitted for laboratory analysis ground water and free product samples from the ground water monitoring wells;
- Performed four weekly free product bailings of the on-site monitoring wells;
- Inspected the site for surface signs of product releases and UST locations;
- Identified potential receptors of the contamination;
- Assessed the risk that the contamination poses to these potential receptors;

- Evaluated the need for additional monitoring wells to determine the degree and extent of petroleum contamination at the site;
- Evaluated the need for treatment and/or a long-term monitoring plan for the site; and
- Prepared a summary report that details the work performed and provides conclusions and recommendations.

1.2 Site Location and Physical Setting

The fuel farm site is located adjacent to the main airport terminal building, on Airport Drive in the City of South Burlington, Vermont (see Figure 1, Site Location Map, and Figure 2, Site Map). The site consists of an unpaved area with both aboveground and underground storage tanks and delivery systems. The fuel farm is surrounded on all sides by paved areas. Parking lots are located to the south and west of the fuel farm. The main terminal building is located approximately 100 feet south of the fuel farm southern boundary. A driveway and the airport control tower are located to the north. A runway ramp and the main runway area lie to the east of the fuel farm.

The site is located in the Champlain Valley, on a terrace above the Winooski River. The site is located on a local topographic high; surface topography is flat and level for several hundred feet in all directions from the site. The Winooski River is located approximately one mile to the east and north of the site, and flows generally westward to Lake Champlain. Approximately one-half mile south of the site, Potash Brook flows westward into Lake Champlain. Approximately one-half mile west and north of the site, several unnamed streams drain toward the west.

The surficial materials at the site are mapped as pebbly marine sands deposited in the Champlain Sea (Doll, 1961). Four soil borings performed for the Burns and McDonnell study encountered fine sands with varying amounts of silt. Bedrock underlying the site is mapped as the Ordovician-age Bascom Formation, which consists of interbedded dolomite, limestone or marble, calcareous sandstone, and limestone breccia (Doll, 1961). The soil borings, which were generally advanced to 22 feet below ground surface, did not encounter bedrock.

2.0 SITE HISTORY

2.1 Petroleum Storage History

The site is currently owned by the City of Burlington, and is managed by the Burlington Airport Commission. The airport has been operated since the 1930s, and the present fuel farm site is believed to have been active since at least the 1950s.

The fuel farm site is used for the storage of aviation fuel. Tank registration records obtained from Mr. Robert McEwing, the Airport Engineer, indicate that five petroleum underground storage tanks (USTs) and five petroleum aboveground storage tanks (ASTs) exist on the site. A partially crushed fill pipe for a sixth UST is visible at the surface on the site. No records of this UST were located in State of Vermont files, and no information on the UST

ownership or history was known to airport officials. Records on former tank ownership and history at the site were not available. Figure 2 in Appendix A shows approximate tank locations, and the table below summarizes known information on the tanks. An additional aboveground storage tank, used for storage of deicing fluid, is located in the southern portion of the site. This tank is not shown on the site map.

Petroleum Storage Tanks at Airport Fuel Farm

Identification	Owner	Type	Age	Size	Contents	Status
Innotech #1	Innotech Av.	UST	1962 or 63	10,000 gal	Jet A	Active
Innotech #2	Innotech Av.	UST	1962 or 63	10,000 gal	Jet A	Active
Innotech #3	Innotech Av.	AST	not stated	12,500 gal	Jet A	Active
Innotech #4	Innotech Av.	AST	not stated	12,500 gal	Jet A	Active
Innotech #5	Innotech Av.	AST	1975	10,000 gal	Jet A	Active
Innotech #6	Innotech Av.	UST	1982	10,000 gal	Jet A	Active
Innotech #7	Innotech Av.	UST	1982	10,000 gal	Av Gas	Active
Innotech #8	Innotech Av.	AST	not stated	12,500 gal	Unld Gas	Active
Innotech #9	Innotech Av.	AST	not stated	12,500 gal	Av Gas	Active
Montair #1	Montair	UST	1981 or 82	10,000 gal	Av Gas	Abandoned
Abandoned UST	Unknown	UST	Unknown	Unknown	Unknown	Abandoned
BP #1	British Petrol.	AST	Not Stated	Not Stated	Not Stated	Removed
BP #2	British Petrol.	AST	Not Stated	Not Stated	Not Stated	Removed

As shown in the above table, all of the ASTs and all of the active USTs are owned and operated by Innotech Aviation of South Burlington, Vermont. The USTs and piping systems are reportedly tightness-tested annually, and no failures have been reported. The Innotech #1 and #2 USTs and #3 and #4 ASTs share a common above ground piping system. Montair Flight Service, listed as owner of the abandoned Montair #1 UST, is reportedly out of business. The ASTs owned by British Petroleum were reportedly removed a few years ago. According to Mr. McEwing, the BP ASTs were located above a concrete pad, and the tank owners reported that they had removed all contaminated soils from the area during the tank removal. No report on the removal was available for this investigation.

2.2 Previous Investigation Results

Subsurface petroleum contamination was discovered at the site in August 1993, as part of a Fuel Farm Relocation Study conducted by Campbell & Paris of Chantilly, Virginia in conjunction with Burns and McDonnell of Overland Park, Kansas. Four soil borings were performed at the site, to evaluate whether soil contamination was present. Soil samples were collected at five-foot intervals with a split-spoon sampler. The borings, which were advanced to a depth of 22 feet, encountered sands, with varying amounts of silt, gravel, and fill. Monitoring wells were installed in three of the borings, with screened intervals from 9 to 19 feet below ground surface.

Soil contamination was detected at all of the boring locations, with Total Petroleum Hydrocarbon (TPH) levels ranging from less than 10 to 23,000 parts per million (ppm), and soil vapor levels measured by photoionization detector (PID) ranging from 0.0 to 287 ppm. Ground water contamination was also detected in samples collected from each of the three monitoring wells installed at the site, with TPH levels ranging from 3.0 to 7.0 ppm (although TPH in a duplicate sample was measured at 60 ppm).

3.0 INVESTIGATIVE PROCEDURES AND RESULTS

3.1 Determination of Ground Water Flow Direction and Gradient

On 27 April 1994, ground water in the surficial aquifer at the site was determined to be flowing toward the southwest at an approximate gradient of 0.1%. The unusually low gradient is representative of the flat site topography.

Water table elevations in the monitoring wells were determined by subtracting the measured depth-to-water in each well from a surveyed top-of-casing elevation. All elevations were measured relative to a storm drain rim elevation on an existing map of the site. In the monitoring wells that contained free product, the apparent water-table elevation was corrected to reflect the water-table depression caused by the presence of free product in the well. The low ground water gradient and the presence of nearly one foot of free product in one well may have reduced the accuracy of the flow direction determination. Water and product level measurements and elevation calculations are presented in Table 1 in Appendix A. A ground water contour map (Figure 3) was prepared using this data.

According to the Burns and McDonnell report, soils in the surficial aquifer underlying the site consist of poorly graded fine sand and varying amounts of silt, with minor occurrences of gravel and fill. Such materials typically have hydraulic conductivities of between 20 and 2,000 ft/yr and an effective porosity of approximately 0.2. Assuming Darcian flow, these estimated values, together with the calculated ground water gradient of 0.1%, yield an estimated average ground water flow velocity of between 0.1 and 10 feet per year.

3.2 Ground Water and Product Sampling and Analysis

Ground water sampling and analysis conducted at the site confirmed the presence of floating free-phase petroleum product in monitoring wells MW1 and MW2 and of dissolved petroleum compounds above Vermont drinking water standards in monitoring well MW3. Analysis of a free product sample collected from MW1 and comparison with petroleum products stored at the site indicated that the petroleum product was Jet-A aviation fuel. Results are summarized in Figure 4 of Appendix A. Analytical results for monitoring well MW3 are summarized in the table below. Laboratory report forms are included in Appendix C.

Ground water sampling was conducted on 27 April 1994, and followed GWV's Ground Water Sampling Protocol. In accordance with this protocol, ground water samples were not collected from the wells that contained free product. A free product sample was collected from

monitoring well MW1 for petroleum identification. MW2 did not contain enough free product for sample collection. GWV collected a trip blank water sample to verify proper quality assurance and quality control (QA/QC), as required by the VT DEC. Because only one ground water sample was collected, the VT DEC approved the elimination of duplicate and equipment blank samples.

The water samples were submitted to an analytical laboratory, where they were tested for the volatile petroleum compounds benzene, toluene, ethylbenzene, and xylenes (collectively termed BTEX) and the gasoline additive methyl-tert butyl-ether (MTBE) by EPA Method 8020, and for Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1. Volatile petroleum hydrocarbon compounds were detected in the ground water sample collected from monitoring well MW3. Analytical results for the monitoring well MW3 sample are summarized as follows:

<u>Compound</u>	<u>Concentration</u>	<u>VT Drinking Water Standard</u>
Benzene	BPQL<20 ppb	5 ppb
Toluene	2,090 ppb	1,000 ppb
Ethylbenzene	36 ppb	700 ppb
Xylenes	181 ppb	10,000 ppb
MTBE	BPQL<20 ppb	40 ppb
TPH	37.3 ppm	none

Notes: ppb - parts per billion
ppm - parts per million
BPQL<20 ppb - Below Practical Quantitation Limit of 20 ppb

The BTEX compounds are volatile petroleum hydrocarbons found in all petroleum fuels, although concentrations are typically much higher in gasoline than in other fuels. MTBE is an octane booster that is added only to gasoline; its absence suggests that the released product is not gasoline. TPH is not regulated in drinking water in Vermont, but is used as an indicator of less volatile petroleum compounds. As shown in the table, only the toluene concentration exceeded the Vermont drinking water standard.

Analytical results from the QA/QC sample indicate that adequate QA/QC was maintained during sample collection and analysis. Although toluene was detected in the trip blank at 4 ppb, the measured concentration is approximately three orders of magnitude lower than the toluene concentration reported by the analytical laboratory for the one ground water sample collected, and thus is not considered to invalidate the sample results. Other volatile petroleum compounds and TPH were not detected in the trip blank sample.

The free product sample collected from monitoring well MW1 was analyzed at a laboratory for identification of the petroleum product. The sample's chromatographic signature was compared with reference samples of several petroleum fuels. The laboratory report stated that the sample pattern was "consistent with that of kerosene, No. 1 fuel oil, or Jet-A aviation fuel." Kerosene and No. 1 fuel oil are not reportedly stored at the site; therefore, the product sample collected from monitoring well MW1 is considered to be Jet A aviation fuel.

3.3 Free Product Recovery

Data trends obtained from manual bailing of monitoring well MW1 suggest that there is not a large volume of easily recoverable free product in the vicinity of this well, and that installation of an automated product recovery system is not warranted at this time. The persistence of a thin layer of product after repeated bailing, however, suggests that a passive recovery system such as a filter canister is likely the most cost-effective method for recovery of product that flows to the well.

Of the three monitoring wells at the site, only monitoring well MW1 contained sufficient free-phase petroleum product for recovery by manual bailing. Monitoring well MW1 was bailed weekly for four weeks. Dates, initial and final product thicknesses, and recovered product volume were recorded in a log book. Approximately 1.8 gallons of free-phase petroleum product were recovered from monitoring well MW1 during four weekly bailings.

Product recovery data is presented in Figure 5 of Appendix A, and is summarized here. Initial product thickness in the well dropped quickly, from 0.90 feet prior to the first bailing to 0.38 feet one week later, then appeared to stabilize at 0.3 - 0.4 feet. Final product thickness declined slightly during the bailing. Recovered product volume dropped linearly with each successive bailing effort, declining from 0.75 gallons in the first bailing to 0.2 gallons in the final bailing. The slope of the cumulative recovery curve appears to be declining.

Extrapolation of the identified trends suggests that manual bailing is unlikely to recover a significant volume of free product from monitoring well MW1. Active recovery systems such as automated pumps would also not be likely to be cost effective, because the product does not appear to be flowing to the well at a high rate. On the other hand, a passive recovery system such as a filter canister can accumulate product that flows into the well. Filter canister systems typically have a membrane, installed at the product/water interface, that permits petroleum but not water to pass through the membrane into a storage canister. The canister is manually removed on a regular basis and emptied into a storage container at the surface. Such systems are relatively inexpensive (under \$1,000), require no electricity or compressed air, and are simple to operate and maintain.

3.4 Soil Gas Survey

The results of a soil gas survey conducted at the fuel farm identified two areas of subsurface petroleum contamination -- one plume in the vicinity of the main fuel-transfer area and an abandoned UST; and a smaller plume near an active gasoline UST and the removed ASTs. The larger plume appears to have resulted principally from spills during fuel transfers from the active USTs and/or ASTs; however, the nearby abandoned UST may be the source of part or all of the contamination. The source of the smaller plume is uncertain; either or both of the nearby fuel storage systems may have been the source of contamination.

Soil gas sample results are tabulated in Table 3 in Appendix A. Sample locations and distribution of total BTX in the soil gas samples are shown in Figure 6 in Appendix A.

The soil gas survey consisted of the installation of stainless-steel probes at 29 locations in the vicinity of the fuel farm. Samples for the soil gas survey were obtained from hollow stainless steel rods, which were generally emplaced at depths of 2.5 feet below ground surface. In a few locations, probes were also driven to deeper depths. Soil gas samples were analyzed on site using a Photovac 10S50 portable gas chromatograph (GC). The GC was calibrated against gas standards for benzene, toluene, ortho-xylene, and meta- and para-xylenes. Equipment blanks and gas standards were run frequently to provide quality assurance and quality control. Standard operating procedures are attached in Appendix B.

3.5 Site Inspection

The site visual inspection consisted of comparison of site features to available records, and observation of ground surfaces for the presence of discoloration, odors, and stressed or absent vegetation. The inspection confirmed the presence and location of all of the tanks that had been reported to be at the site. All of the aboveground tanks appeared to be in good condition, and no staining was observed in the immediate vicinity of these tanks. Stained soils with petroleum odors were noted at several locations beneath aboveground piping that serves the Innotech #1 and #2 USTs. Areas of staining included soils beneath a piping union and beneath a hand pump above UST #2. During the site inspection, product was observed to be dripping from this pump onto the stained area for a short duration (approximately five minutes), at a rate of approximately 3 drips per second.

Several fuel transfer points are located along the eastern edge of the fuel farm, near the edge of pavement (see Figure 2 for approximate locations). The areas immediately beneath the transfer couplings are unpaved. According to a site diagram obtained from the Airport Engineer, the transfer points for all of the Innotech ASTs and Innotech #1 and #2 USTs are located adjacent to one another in a "main" fuel transfer area located immediately to the south of the Innotech #4 AST. Soils underlying the transfer couplings had noticeable petroleum odors, and appeared to be stained with petroleum. An airport operations official indicated that there had been several product releases in this area. None of the releases had apparently been reported to the VT DEC.

4.0 SOURCE AREA DISCUSSION

The results of the investigation suggest that petroleum product has been released from at least two, and possibly at least three source areas. The probable source areas are as follows:

- the main fuel-transfer / abandoned UST area,
- and the Innotech #1 UST and #2 UST area,
- the former BP AST / Innotech #7 UST area.

4.1 Main Fuel Transfer / Abandoned UST Area

The distribution of soil-gas concentrations, the ground water gradient at the site, and the observations of petroleum odors and staining in soils beneath transfer couplings suggest that spills during fuel transfers in the main fuel transfer area are the principal source of soil and ground water contamination in this area. A nearby abandoned UST of unknown history may also be at

least partly responsible for the contaminant plume. The apparent presence of soil-gas contaminants upgradient of the likely source area may indicate additional contributions from the smaller fuel dispensing areas to the north, but may instead represent lateral spreading of contaminants upon reaching the nearly flat water table that underlies the site. The contaminant plume also shows a discernible lengthening in the downgradient direction from the likely source area.

Additional investigation will be necessary to determine the degree and extent of ground water contamination in this area. It is possible that the thin layer of free-phase petroleum product in MW2 represents the downgradient edge of a free-product plume. Observations of petroleum odors and staining in the fuel transfer area suggests that the releases to the subsurface may be continuing.

4.2 Innotech #1 and #2 USTs

The presence of nearly one foot of free product in monitoring well MW1 suggests that a petroleum release has occurred near the well. Because only a thin layer of free product was observed in monitoring well MW2, located upgradient from MW1 and closer to the fuel transfer area, it is likely that the product observed in monitoring well MW1 originated from a source located closer to MW1. Stained soils and a short-duration active leak were noted beneath aboveground piping systems immediately above the Innotech #1 and #2 USTs; personal communication with airport operations officials indicated that several piping leaks have occurred in this system.

Soil-gas results suggest that ground water contaminants have not migrated significantly downgradient from the vicinity of MW1. Additional monitoring wells will be needed in this area to determine the extent of contaminant migration downgradient of MW1. Observations of an active piping leak, and petroleum odors and staining in soils beneath several sections of the piping system suggest that occasional releases may be continuing.

4.3 Former BP AST Locations and Innotech #7 UST

A smaller soil-gas plume with an apparently separate source was identified in the area between the former BP ASTs and the active Innotech #7 UST. One sampling location (VP1) in this area had detectable concentrations of petroleum compounds in the soil gas. This area is upgradient from the larger soil-gas plume, and is separated by soil-gas sampling locations in which no contaminants were detected. Dissolved petroleum compounds were detected in a ground water sample collected from the monitoring well located in this area (MW3); toluene was the only compound detected above Vermont drinking water standards.

The source of contamination in this area was not determined; the most likely sources are the removed BP USTs and the active Innotech UST #7. Additional monitoring wells in this area are needed to determine the source, degree and extent of contamination.

5.0 RECEPTOR SURVEY AND RISK ASSESSMENT

Potential receptors identified during this investigation include the airport building, the airport control tower, and an unnamed tributary to Potash Brook. No drinking water supply wells were identified within one-half mile of the site. The identified contamination does not appear to pose a significant risk to any of these receptors.

During this investigation, GWV conducted a survey of the area surrounding the site to identify potential sensitive receptors of the contamination. The nearest downgradient surface drainage is an unnamed tributary of Potash Brook, approximately one-half mile south of the site. The nearest downgradient building is the airport terminal building, located approximately 100 feet south of the fuel farm's southern boundary.

On the basis of the findings reached during this investigation, GWV has qualitatively evaluated the risks that the contamination at the site poses to these potential receptors. Jet-A fuel and aviation gasoline contain several compounds that are hazardous to human and animal health, including one (benzene) that is listed by the U.S. Environmental Protection Agency (EPA) as a known human carcinogen. The most common routes of exposure include ingestion of compounds that have migrated to drinking water supplies and inhalation of vapors that have migrated into buildings.

The risk of ingestion of petroleum compounds that have migrated to drinking water supplies does not appear to be significant. All properties within one-half mile of the site are reportedly served by the Champlain Water District, which obtains drinking water from Lake Champlain.

The risk of petroleum vapor inhalation also does not appear to be significant. The airport terminal building is the only building within 1,000 feet downgradient from the fuel farm. The terminal is reportedly constructed on a concrete slab, and does not have a basement. No underground utilities are known to pass through the area of known contamination directly into the terminal building. Vapor migration into the building is thus considered unlikely.

Ground water that flows through the surficial aquifer past the site will eventually discharge to a surface water body. Because petroleum compounds can also impact surface water bodies and water-dwelling organisms, the risk to nearby streams was assessed. The unnamed Potash Creek tributary located approximately one-half mile southwest of the site is considered to be the most likely discharge point. The distance between the site and the creek, together with the expected low ground water flow velocities, suggest that the natural processes of adsorption, dilution, dispersion, and degradation will reduce petroleum compound concentrations in ground water to below detectable levels prior to discharge to this or any other surface water body.

6.0 CONCLUSIONS

On the basis of the above-described investigation, Ground Water of Vermont has concluded the following:

1. The degree and extent of petroleum contamination at the site has been evaluated with a soil-gas survey. Two soil-gas contaminant plumes are suggested by the data-- a larger plume located in the vicinity of as well as downgradient from the main fuel transfer area and an abandoned UST of unknown history, and a smaller isolated area of contamination between the former BP AST locations and the Innotech #7 UST.
2. Monitoring results from the existing monitoring wells confirm that ground water beneath the site has been impacted by petroleum compounds. On 27 April 1994, free-phase petroleum product was measured in monitoring wells MW1 (0.90 feet) and MW2 (0.04 feet). Laboratory analysis of a ground water sample collected from monitoring well MW3 indicated the presence of dissolved petroleum compounds, with toluene present above Vermont drinking water standards.
3. The degree and extent of ground water contamination at the site has not been adequately evaluated. The contamination detected in the three existing monitoring wells may have originated from at least three separate sources. Results of the soil-gas survey suggest that ground water contamination is largely confined to the vicinity of the fuel farm, however.
4. Laboratory analysis of a free-product sample collected from monitoring well MW1, and comparison of the results to petroleum products reportedly stored at the site, indicate that the product is Jet A fuel. The thin layer of petroleum product observed in monitoring well MW2 appeared to be the same type of product, but was not present in sufficient thickness for sample collection.
5. Approximately 1.8 gallons of free-phase petroleum product were recovered from monitoring well MW1 during four weekly bailings. Data trends suggest that there is not a large volume of easily recoverable product in the vicinity of this well.
6. The surficial aquifer at the site consists of fine sand and varying amounts of silt, with minor occurrences of gravel. Ground water in this aquifer was measured to be flowing toward the southwest at a gradient of approximately 0.1%. The presence of free product in two of the three monitoring wells may have interfered with the accurate determination of flow direction, however. The low ground water gradient is due to the topographic location of the site in a broad, flat topographic high area.
7. The results of the investigation indicate that there have been releases of petroleum to the subsurface at the site, possibly from three or more separate locations. The principal source areas identified during this investigation include the main fuel transfer/abandoned UST area; the Innotech #1 and #2 UST area; and the former BP AST and Innotech #7 UST area.
8. The principal contaminant source in the main fuel transfer/abandoned UST area appears to be occasional spills during fuel transfers to one or more of the following tanks: Innotech #1 and #2 UST; Innotech #3 #4, #8, and #9 AST, but the nearby abandoned UST may

also be responsible for part or all of the identified contamination. The soil-gas results and the presence of free product in monitoring well MW2 downgradient from the source area suggest that a significant contaminant mass exists in soil and ground water beneath this area.

9. The principal contaminant source in the Innotech #1 and #2 UST areas appears to be occasional releases from aboveground piping that serves these systems. The presence of 0.90 feet of jet fuel in monitoring well MW1 suggests that a free-product plume may have originated from this source.
10. The principal contaminant source in the northwestern part of the site was not determined. The former BP ASTs and the active Innotech #7 UST are the most likely sources.
11. Reported leaks in the aboveground piping system serving the Innotech #1 and #2 USTs and the lack of spill containment systems in the fuel transfer areas represent continuing threats of petroleum releases to the subsurface at the site.
12. The existing soil and ground water contamination at the site does not appear to pose a significant threat to any nearby identified sensitive receptors.

7.0 RECOMMENDATIONS

On the basis of the findings reached during this investigation, Ground Water of Vermont makes the following recommendations:

1. Additional ground water monitoring wells should be installed and sampled for dissolved and free-phase petroleum compounds, to define the source(s), degree and extent of ground water and/or free-phase product contamination resulting from each of the three apparent source areas and to confirm the ground water flow direction. Results of the additional monitoring can then be used to determine whether a Corrective Action Feasibility Investigation is warranted.
2. As required by Vermont regulations, free product in monitoring well MW1 should be recovered, stored at the surface, then disposed of as hazardous waste. Because the product is considered to be hazardous waste recovered at a "hazardous waste site," the product removal should be performed by personnel who have received training as specified in OSHA 1910.120 (the Hazardous Waste Operations and Emergency Response, or HAZWOPER, standard). This requirement was recently verified by personnel from the Vermont Occupational Safety and Health Administration (VOSHA). It is likely that the most cost-effective recovery method for this well will be installation and operation of a passive recovery system such as a filter canister. Such systems are relatively inexpensive (<\$1,000), and are simple to install, operate, and maintain. Accumulated product can be quickly removed and transferred to an aboveground storage container on a regular basis.
3. Water levels and product thicknesses in monitoring wells MW2 and MW3 should also be monitored regularly. If free product is found to be present in either well in a thickness greater than 1/8', the product should be removed and handled similarly to the product recovered from MW1. On the basis of existing data that indicate no product in MW3 and

only 0.02 to 0.04 feet of product in MW2, it appears that manual bailing will be the most cost-effective recovery method for these wells.

4. The two abandoned USTs at the site should be permanently closed in accordance with State regulations.
5. Compliance of current fuel handling practices with State and Federal regulations should be verified.
6. Suspected and confirmed product releases from any UST system, including spills or overfills that result in product releases in excess of two gallons, should be reported to the VT DEC, in accordance with Subchapter 6 of the Vermont UST regulations.

APPENDIX A

Figures and Tables

AIRPORT
TERMINAL

UNPAVED

CONCRETE

ASPHALT
PARKING
LOT

UNPAVED

FORMER BP ASTS

ASPHALT
PARKING
LOT

SCALE.

Ground Water of Vermont

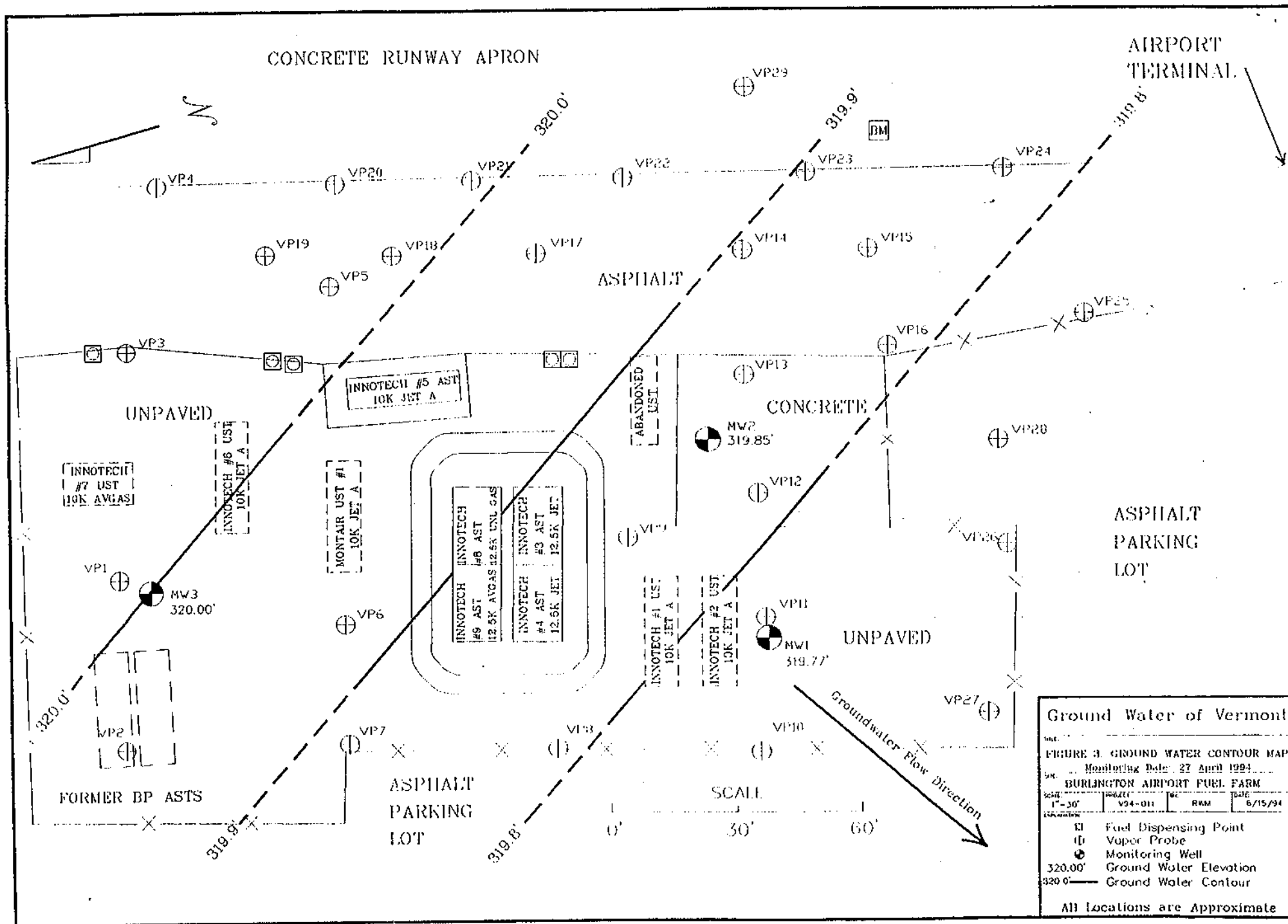
FIGURE 2. SITE MAP

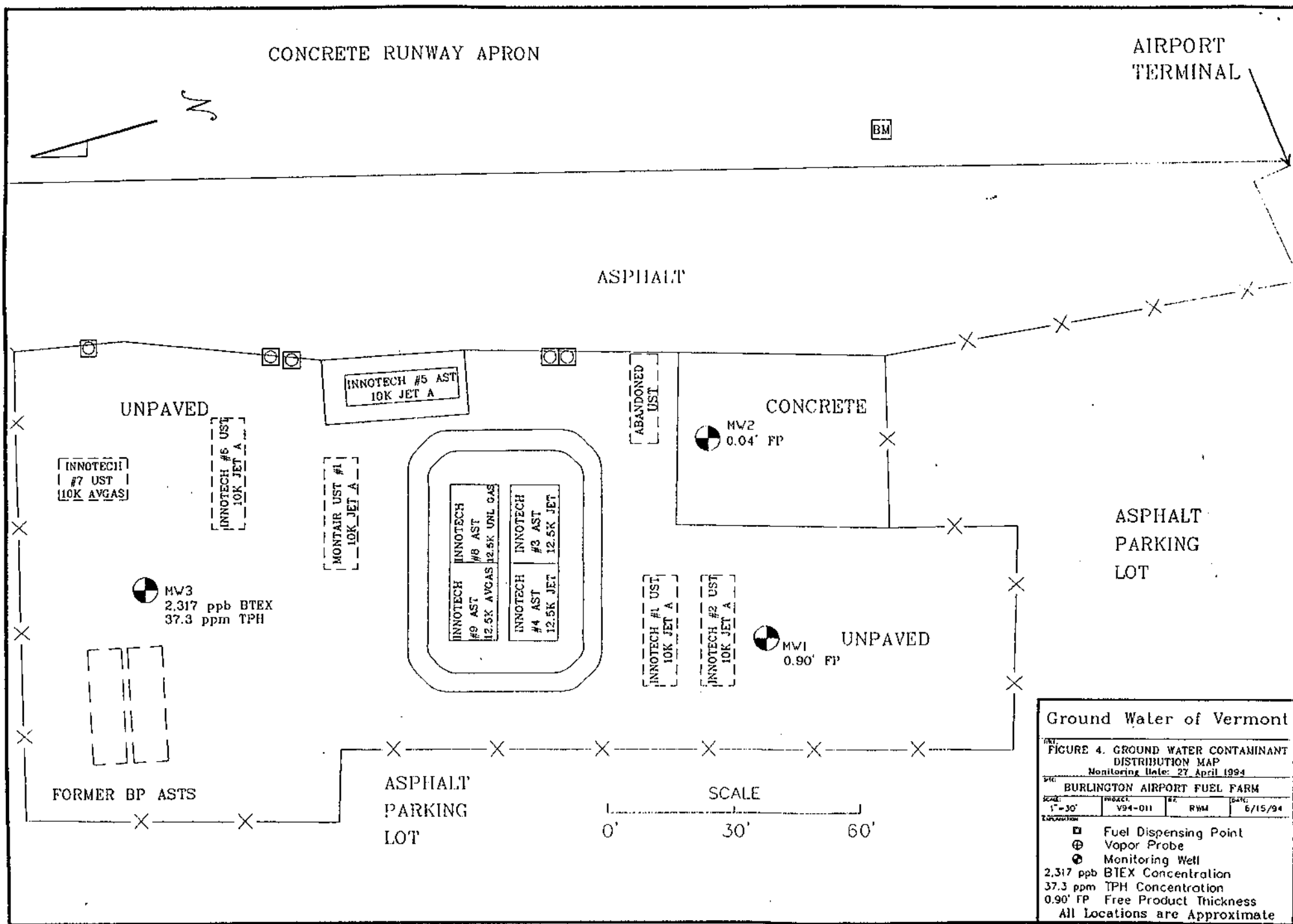
BURLINGTON AIRPORT FUEL FARM

SCALE: 1" = 30'	PROJECT: V94 011	SHEET: RWM	DATE: 6/15/94
--------------------	---------------------	---------------	------------------

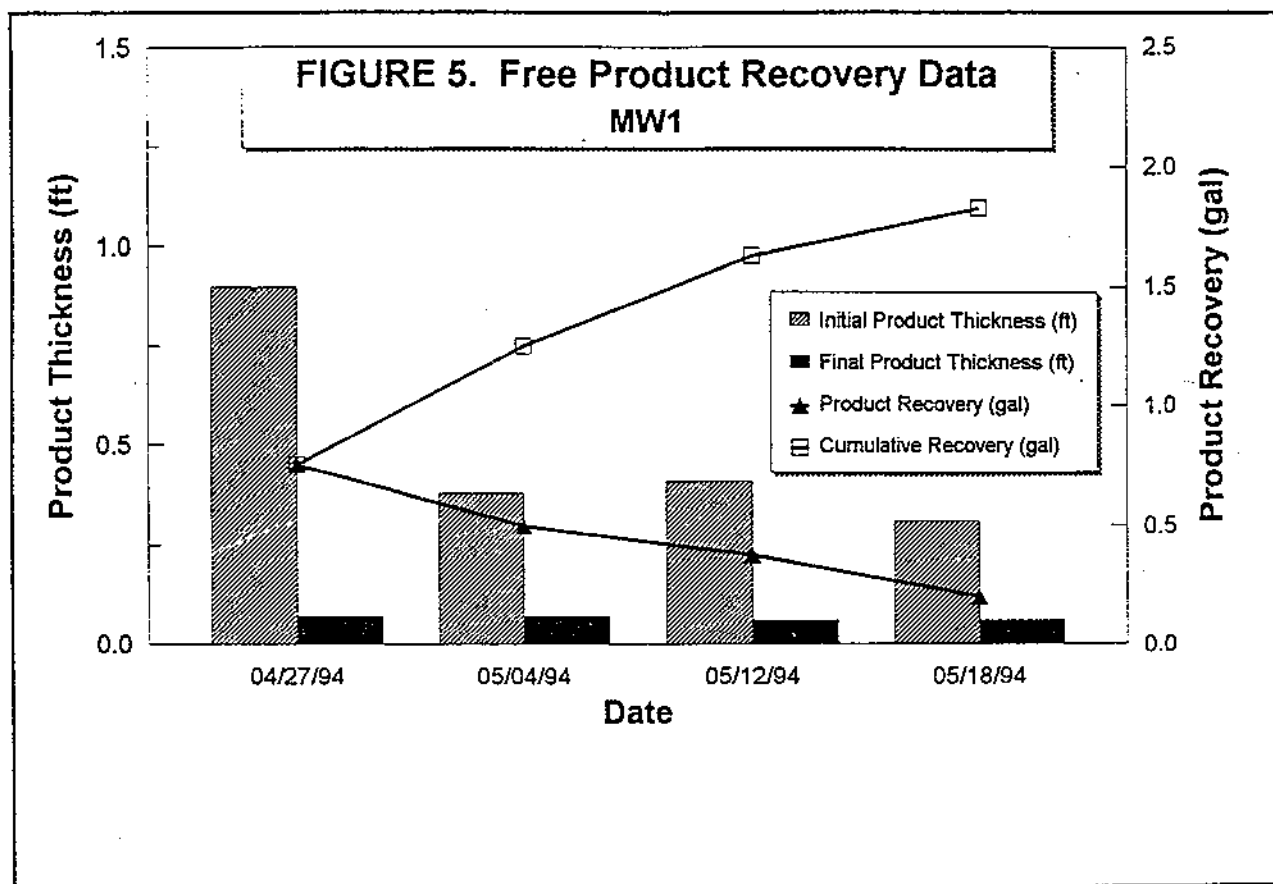
- Fuel Dispensing Point
- Vapor Probe
- Monitoring Well

All locations are Approximate





Ground Water of Vermont				
FIGURE 4. GROUND WATER CONTAMINANT DISTRIBUTION MAP				
Monitoring Date: 27 April 1994				
BURLINGTON AIRPORT FUEL FARM				
SCALE	PROJECT	BY	RHM	DATE
1" = 30'	V94-011	RT		6/15/94
Legend				
<ul style="list-style-type: none"> Fuel Dispensing Point Vapor Probe Monitoring Well 2,317 ppb BTEX Concentration 37.3 ppm TPH Concentration 0.90' FP Free Product Thickness All Locations are Approximate 				



Free Product Recovery Data - MW1

Date	Initial Product Thickness (ft)	Final Product Thickness (ft)	Product Recovery (gal)	Cumulative Recovery (gal)
04/27/94	0.90	0.07	0.75	0.75
05/04/94	0.38	0.07	0.50	1.25
05/12/94	0.41	0.06	0.38	1.63
05/18/94	0.31	0.06	0.20	1.83

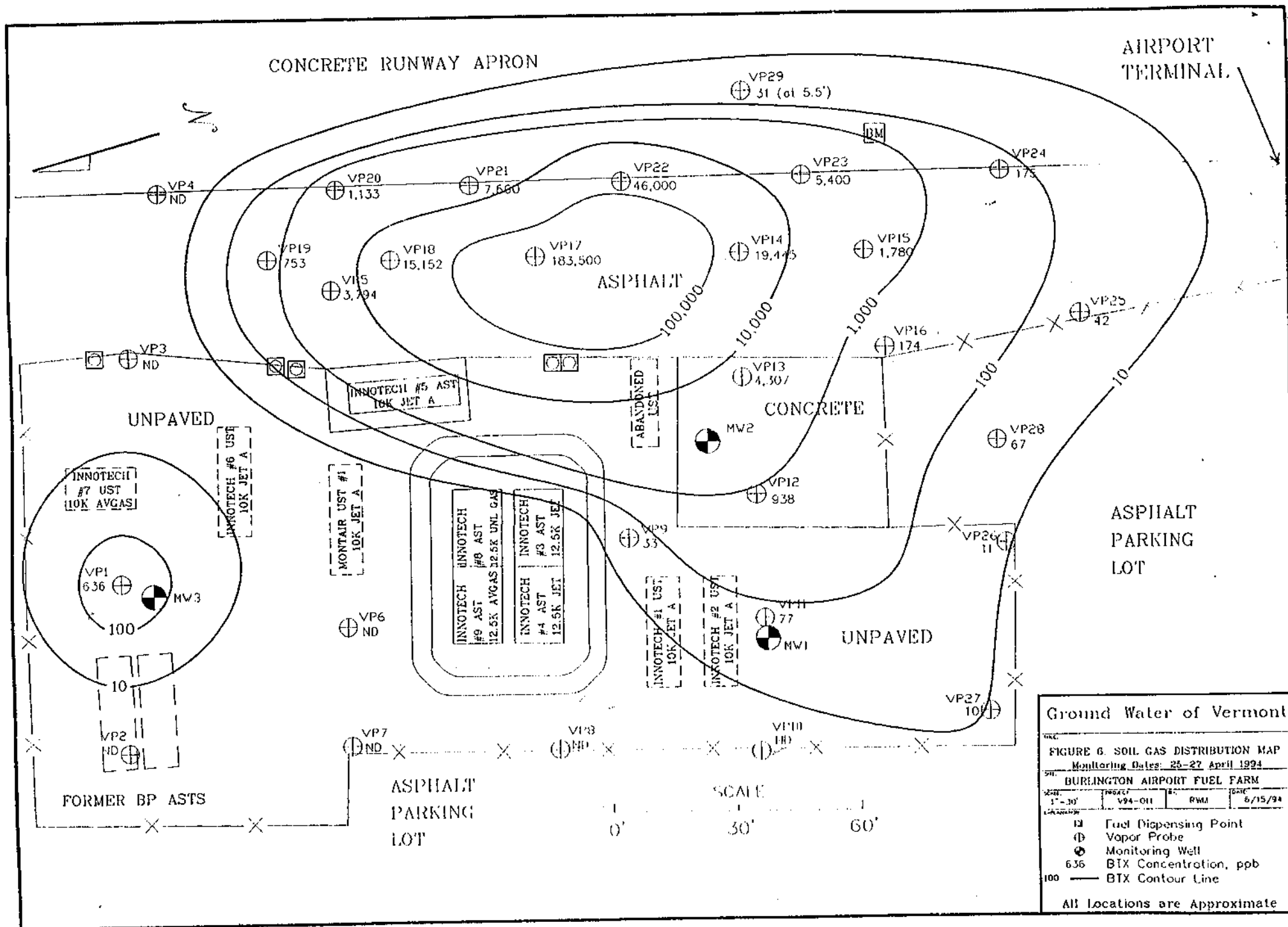


Table 1. Liquid Level Elevations
Burlington Airport Fuel Farm
South Burlington, Vermont

Monitoring Date: 27 April 1994

Well I.D.	Well Depth	Top of Casing Elevation	Depth To Product	Depth To Water	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	19'	331.83	11.88	12.78	0.90	0.80	0.72	12.06	319.77
MW-2	19'	331.94	12.08	12.12	0.04	0.80	0.03	12.09	319.85
MW-3	19'	332.02	-	12.02				12.02	320.00

**TABLE 2. Soil Gas Results
Burlington Airport Fuel Farm
25 - 27 April 1994**

Sample #	Depth (ft)	Benzene (ppb)	Toluene (ppb)	M,P Xylene (ppb)	O Xylene (ppb)	Total BTX (ppb)
VP1	2.5	61	575			636
VP1	5.5	109	808			917
VP1	8.0	87	679			766
VP2	2.5					ND
VP3	2.5					ND
VP4	2.5					ND
VP5	2.5	654	3,140			3,794
VP6	2.5					ND
VP7	2.5					ND
VP8	2.5					ND
VP9	2.5	ND	33			33
VP10	2.5					ND
VP11	2.5	32	45			77
VP11	5.5					ND
VP12	2.5	93	664		181	938
VP13	2.5	417	3,890			4,307
VP14	2.5	2,390	16,970		85	19,445
VP15	2.5	386	1,180	214		1,780
VP16	2.5	44	130			174
VP17	2.5	26,700	156,800			183,500
VP18	2.5	3,550	11,530	72		15,152
VP19	2.5	165	588			753
VP20	2.5	207	926			1,133
VP21	2.5		7,600			7,600
VP22	2.5		46,000			46,000
VP23	2.5		5,400			5,400
VP24	2.5		175			175
VP25	2.5	25	17			42
VP26	2.5		11			11
VP27	2.5		10			10
VP28	2.5	55	12			67
VP29	5.5		31			31

Notes: ppb - parts per billion

Equipment blanks analyzed after approximately every five samples.
All equipment blank results were below detection limits.

APPENDIX B

Soil Gas Sampling Protocols

**Ground Water, Inc.
Standard Protocol
FSPRO-3**

Revision Date: November 19, 1992

Soil Gas Sampling

- A. Applicability: This method is used to detect volatile organic hydrocarbons (VOC's) in the soil gas by sampling temporary and permanent vapor probes. Permanent vapor probes allow repetitive vapor sampling at fixed points. Temporary probes provide rapid assessment of plume dimensions and migration direction.
- B. Equipment
1. Soil Gas Probes: Environmental Instruments Inc. 2.5 ft. hollow stainless steel lengths with slam bar and threaded rod connections.
 2. Plastic Tubing: Various types.
 3. Low Flow Sampling Pump: Various models used: Small, hand-held, battery-operated, diaphragm pump with maximum flow rate of 2.2 liters per minute.
 4. Hand-held below pumps: various sizes/models used.
 5. Low Flow Rotometer: Brooks Instruments "Show Rate" Model: maximum flowrate of 4.6 liters per minute.
 6. Tedlar Bags: SKC Inc.: 1 liter tedlar sampling bags
 7. Gas Sampling Bulbs: Supelco 250 ml to 1 volume with air tight gas stop-cocks.
 8. Volumetric Syringes: Hamilton Inc: various sizes and models used from 1ul to 1ml in size. Both Teflon and steel plunger models used.
 9. Photoionization Detector: Photovac Inc. TIP II: equipped with 10.2 eV photoionization lamp.
 10. Portable Gas Chromatograph: Photovac Inc. 10S50: set-up with dual column configuration including 1.) 1 ft. CSP 20 column used for gross hydrocarbon screening and 2.) 32.4 ft. CPSIL 5 capillary column used for analytical work and compound identification. The chromatograph is equipped with a 10.2 eV photoionization lamp. The column is heated by an isothermal oven with temperature settings between 20 and 50 degrees C. Ultra Zero grade air is used as carrier gas.

11. Brass T-fitting: brass fitting with one end threaded to match soil gas probes, one threaded with a nipple hose connector and one fitted with a teflon septa for syringe sampling.
- C. Permanent Probes: Permanent Probes are installed by hollow stem auger drill rig method. Wells consist of a one foot long section of 1.5" diameter slotted PVC followed by the necessary amounts of 1/2" diameter schedule 40 riser to bring the vapor well to grade. Teflon tubing is attached to the screen with brass fittings and runs the length of the riser to the surface. #2 sand is placed against the screen and beniseal is used to seal the probe inlet from the surface. The probe is protected with standard curb stop or locking cap well protectors.
- D. Temporary Probes: Temporary probes consist of hollow sections of hardened stainless steel tubing which are threaded to a hardened point. A slotted 6 inch screen section is attached directly to the hardend point allowing access to the soil gas. These sections are driven into the ground using a slam bar. An electric drill is sometimes used to puncture asphalt and concrete. Once at the desired depth (usually between 3 and 5 feet although deeper sampling is possible in favorable field conditions) the probes are ready for sampling.
- E. Sampling: A low flow pump or a hand pump is used for sampling (approximately 2 liter/min.). This pump is attached through the Tee fitting the probe with flexible tubing. The pump is used to purge approximately 1 liter of air from the probe and fill the probe with ambient soil gas. Since the probe has an internal volume of approximately 100 ml/rod, this purging will adequately recharge the probe. During purging, the flow rate and vacuum can be determined using a low flow rotometers and vacuum gauges to evaluate soil permeability between sampling points. The pump outlet is then connected to 1 liter Telar sample bags or to a sample bulb which are filled for approximately 45 sec. to 1 min. The Telar bags or bulbs are then sealed and analyzed. Alternatively, samples can be obtained with air tight syringes at the teflon septa port of the tee fitting for direct injection into the GC.
- F. Analysis: Two instruments are typically used for analysis (although the bags can also be submitted to a laboratory for more precise analysis): The Photovac 10S50 portable gas chromatograph and the Photovac "TIP" photoionization detector. The "TIP" is calibrated to 100 ppm Isobutylene and zeroed before soil gas samples are read. The Photovac 10S50 portable gas chromatograph is calibrated by preparing a specific standard in a 1 liter Tedlar Bag using the following formula:

$$V = \frac{760}{VP} (C)(vol)$$

where:

v = volume of headspace over pure standard (in μl)
 VP = standard's vapor pressure (in mm Hg)
 C = desired concentration (in ppm)
 vol = container volume (1 liter for Tedlar bags)

The instrument is calibrated by injecting volumes of vapor standard into the chromatograph using various sized syringes. Compounds are identified by their retention times in the columns. Concentrations are determined by the area under each chromatograph peak. The gas chromatograph keeps retention times constant by maintaining the column oven at a constant 40 degrees C and carrier gas flow rates of a constant 10 mls per minute. These settings can be varied slightly for specific monitoring jobs. Manufactured calibration gases (typically obtained from Scott Gases or National Air Gas) are sometimes used when analyzing for specific solvent mixtures and gasoline.

Samples are analyzed in the same fashion. Before injection, each bag/sample is analyzed with the photoionization detector to gauge the sample's concentration. This can also be accomplished by using the 1 ft. screening column. Syringes are used to inject sample volumes from the Tedlar bags into the gas chromatograph. The chromatograph uses a computer to compare retention times and peak areas to standards so that unknown compounds can be identified and concentrations determined. Experience has shown that detection limits for common volatile compounds are approximately 1 ppb V.

G. QA/QCs

1. Tedlar bags and Sampling Bulbs - All Tedlar bags are purged with three air volumes prior to sampling. Prior to analysis, each bag is filled with ambient air and analyzed on the photo ionization detector. No bag with readings above one ppm relative to a 100ppm isobutylene standard is used. Following sampling and analysis, each bag is quickly evacuated to prevent adsorption of contaminants. Clean bags are kept separate from used bags at all times. Each bag is numbered and each sample location # is recorded with its corresponding bag #, and the sample results. Bag blanks are not analyzed when sampling with the direct injection method.
2. Blanks - The bag # and the results of bag blanks are recorded along with the other sample results. Blanks are also be taken through the soil gas sampler to check on cross contamination. One bag blank and one equipment blank are analyzed for every ten sample locations. One bag blank will be run before calibration to check on the completeness of bag purging.
3. Reporting - Sample results are compiled in a table which records the following data: Sample #, location, injection size, gain (sensitivity), and response. Calibration runs will be identified by the electrical response of the detector to a standard. Samples are quantified by comparing their electrical

responses relative to the standard. Chromatograms are included as an appendix to the report.

4. Decontamination - portable probes are cleaned with a methanol/water mix followed by a deionized water rinse between each sampling location. The low flow pump is run continuously during the field work to constantly flush the pumping diaphragm with ambient air.

APPENDIX C

Laboratory Report Forms



CLIENT NAME:	Groundwater of Vermont	MAV CONTROL NO.:	8797
ADDRESS:	One Mill Street Box C-5 Burlington, VT 05401	PROJECT NO.:	V94-011
SAMPLE LOCATION:	Burlington Airport Fuel Farm	DATE OF SAMPLE:	4/27/94
SAMPLER:	Ron Miller	DATE OF RECEIPT:	5/2/94
		DATE OF ANALYSIS:	5/12/94
ATTENTION:	Ron Miller	DATE OF REPORT:	5/23/94

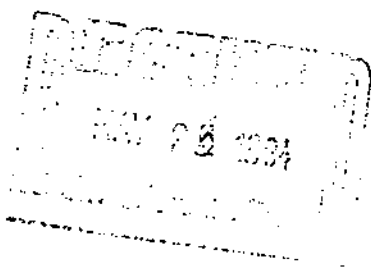
PETROLEUM PRODUCT IDENTIFICATION

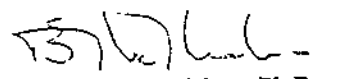
A semivolatile organic compound analytical method was developed with the objective of facilitating the discrimination of common petroleum products. A brief outline of this procedure follows:

- Dilute neat sample 1:200 in CS₂
- Inject 2 microliters of diluted sample into split injection port of GC with DB-5 capillary column. Injection temperature = 40°C, hold 1 minute. Temperature program = 10°C/min to 320°C. Detector is Ion Trap GC/MS tuned for DFTPP.
- From the full mass spectral data obtained for every scan in the chromatogram, the mass spectral data are displayed in the form of selected ion chromatograms. These selected ion chromatograms along with the total ion chromatogram (TIC) are presented in a stacked form with time or scans as the common axis. The selected ions are grouped together to be specific for the following classes of hydrocarbon compounds: (a) alkanes (aliphatics), (b) olefins and cyclic alkanes, (c) benzene, (d) alkylbenzenes, (e) alkylnaphthalenes, and (f) alkylanthracenes.
- The resulting compound class-specific chromatographic patterns are compared to those obtained from reference petroleum products such as gasoline, kerosene, and No. 2 fuel oil.

RESULT:

The free product of Sample MW-1 produced a chromatographic pattern consistent with that of kerosene, No. 1 fuel oil, or Jet- A aviation fuel.




Brendan McMahon, Ph.D.
Director, Chemical Services

Chromatogram Plot

C:\SATURN\DATA\8797MW1

Date: 05/12/94 17:10:27

Comment: 8797 GWV MW-1 PETROLEUM ID

Scan No: 1

Retention Time: 0.01

RIC: 0

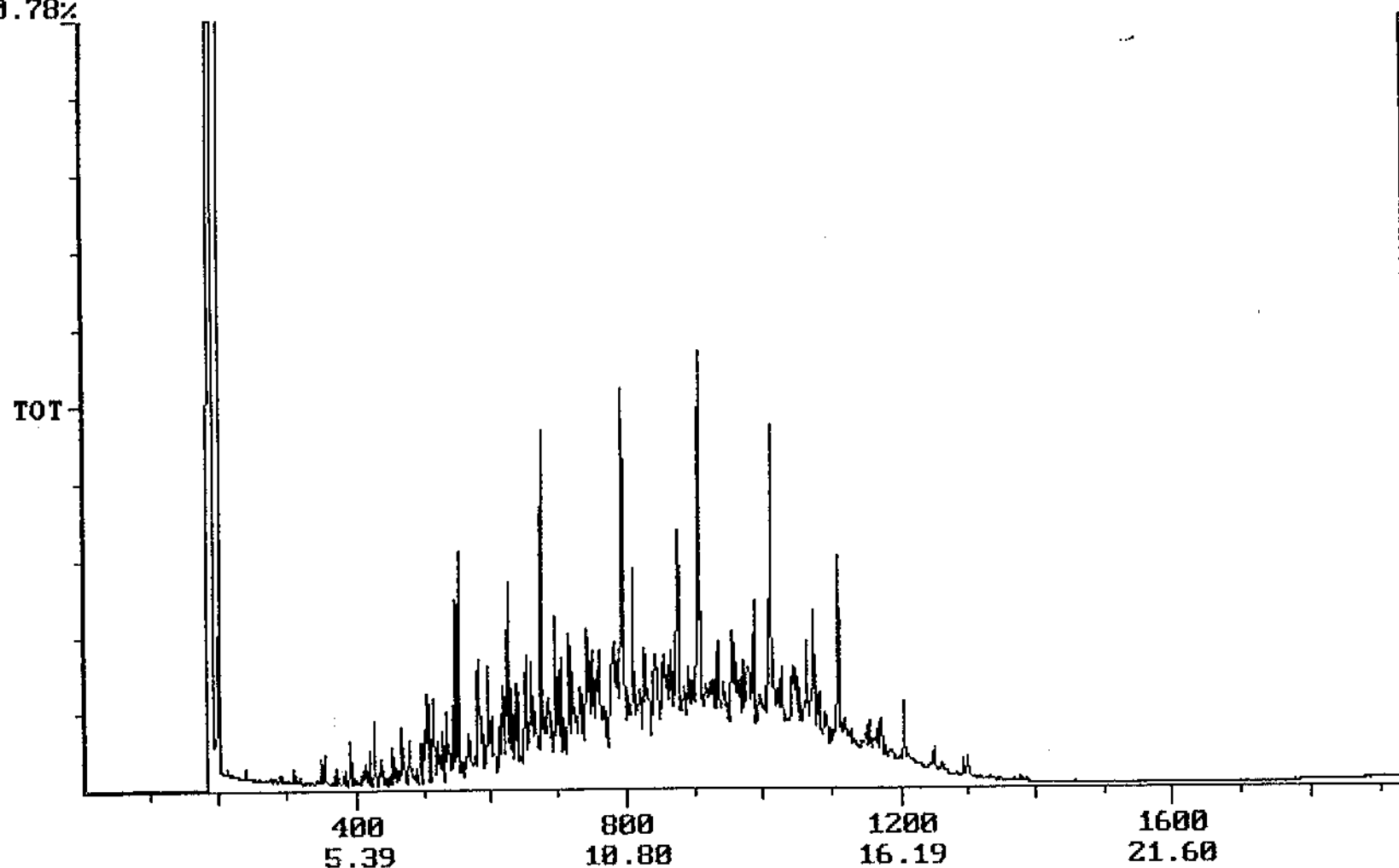
2 ass Range: 0 - 0

Plotted: 1 to 1926

Range: 1 to 1926

100% = 452204552

0.78%



Chromatogram Plot

C:\SATURN\DATA\8797MW1

Date: 05/12/94 17:10:27

Comment: 8797 GWU MW-1 PETROLEUM ID

Scan No: 1

Retention Time: 0.01

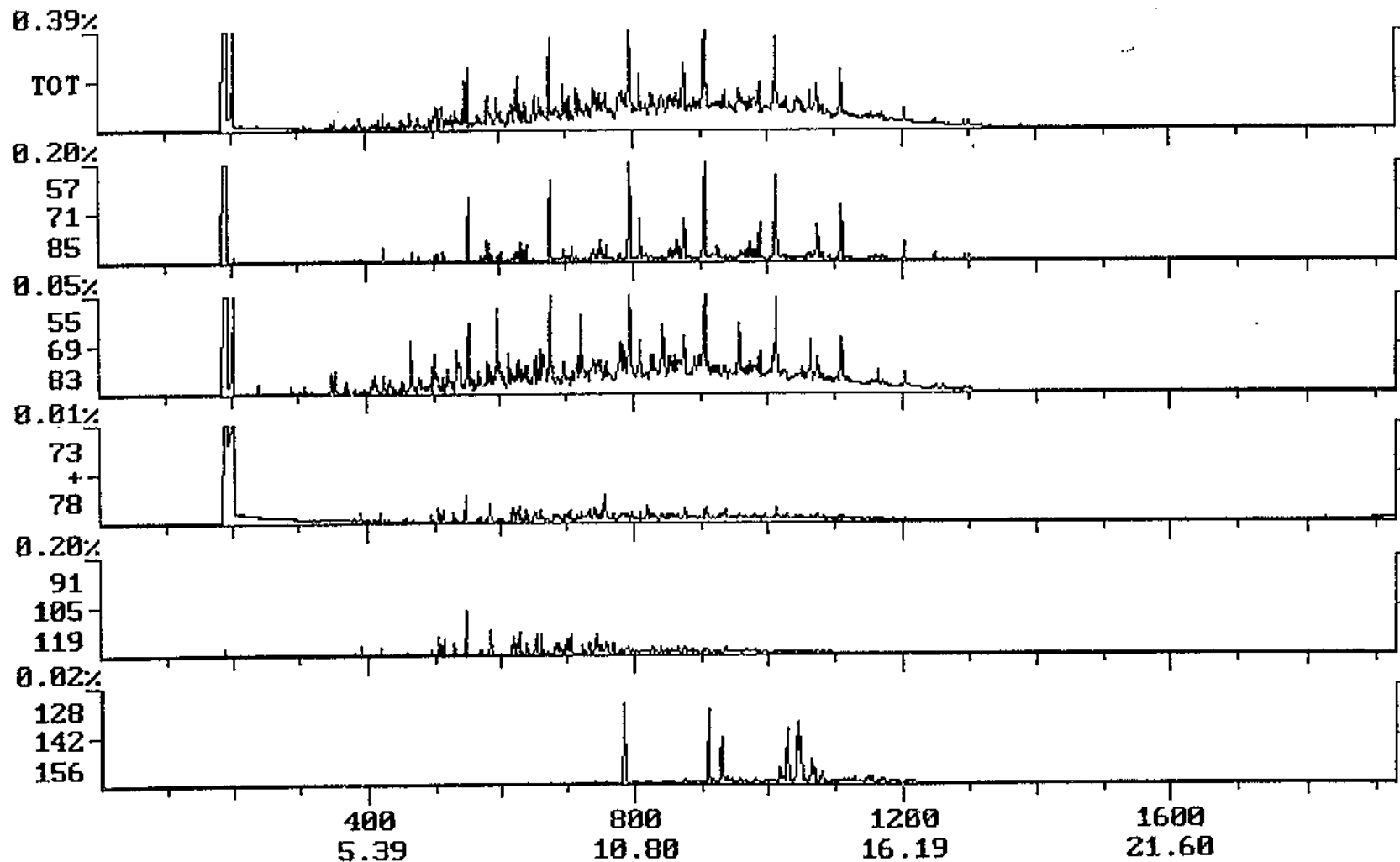
RIC: 0

Mass Range: 0 - 0

Plotted: 1 to 1926

Range: 1 to 1926

100% = 452204552



Chromatogram Plot

C:\SATURN\DATA\STD_#2FU

Date: 10/31/93 12:22:03

Comment: #2 FUEL OIL/DIESEL STD 1:200 IN CS2 (ZUL-INJ)

Scan No: 1

Retention Time: 0.01

RIC: 0

Mass Range: 0 - 0

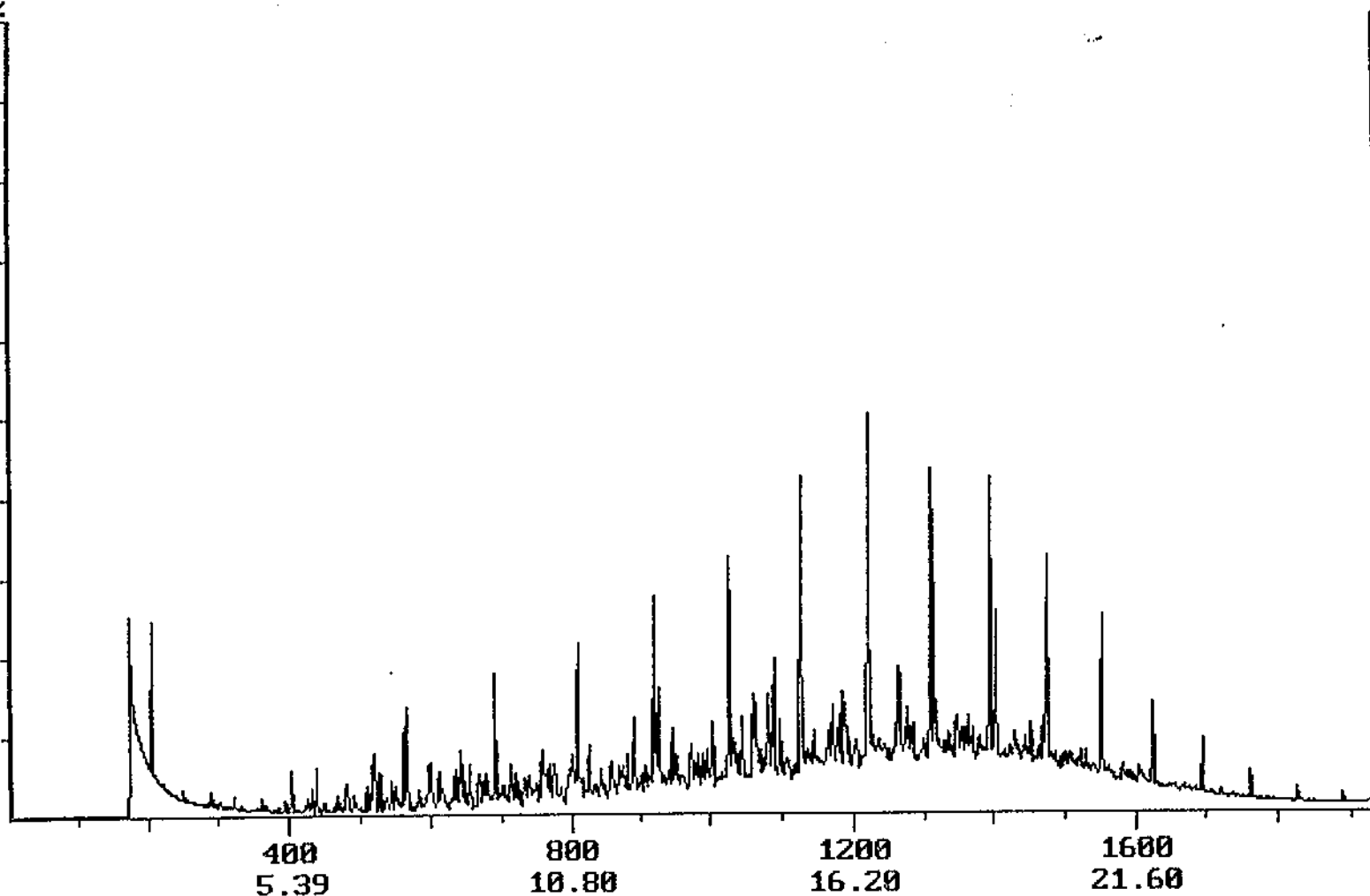
Plotted: 1 to 1925

Range: 1 to 1925

100% = 860617

200%

TOT



Chromatogram Plot

C:\SATURN\DATA\STD_KERO

Date: 10/31/93 11:40:25

Comment: KEROSENE STANDARD 1:200 IN CS2 (ZUL INJ)

Scan No: 1

Retention Time: 0.01

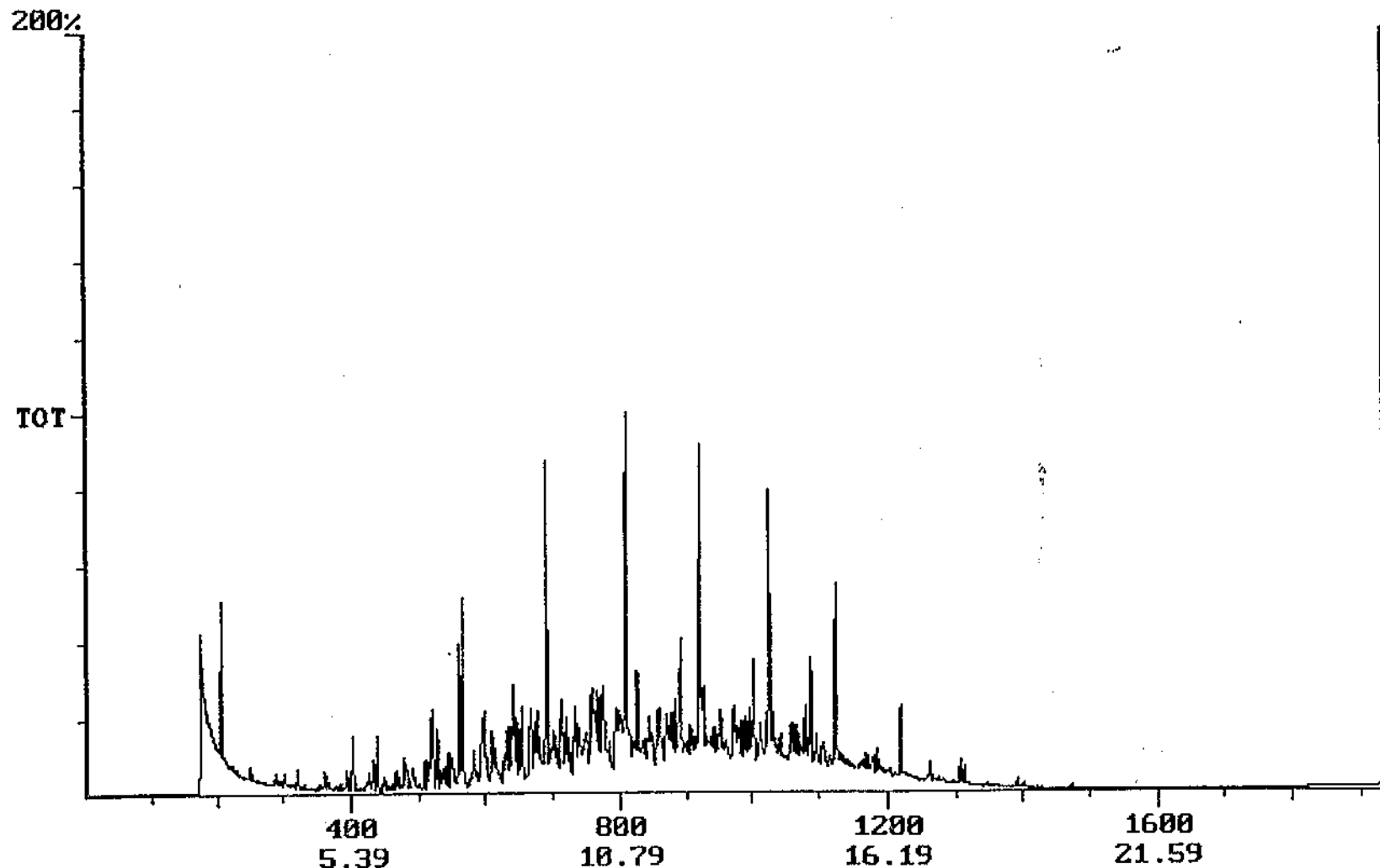
RIC: 0

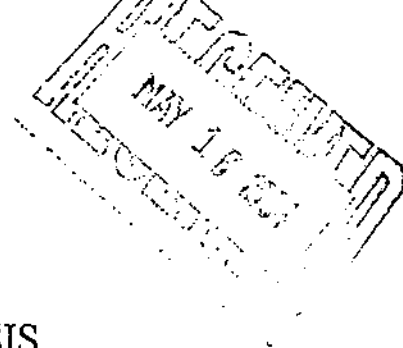
Mass Range: 0 - 0

Plotted: 1 to 1925

Range: 1 to 1925

100% = 956977





LABORATORY ANALYSIS

CLIENT NAME:	Groundwater of Vermont	REF #:	8797
ADDRESS:	One Mill Street, Box C-5 Burlington, VT 05401	PROJECT NO.:	V94-011
SAMPLE LOCATION:	Burlington Airport Fuel Farm	DATE OF SAMPLE:	4/27/94
SAMPLER:	Ron Miller	DATE OF RECEIPT:	5/2/94
		DATE OF ANALYSIS:	5/10,11/94
ATTENTION:	Ron Miller	DATE OF REPORT:	5/11/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The inferred efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-011
PROJECT NAME:	Burlington Airport Fuel Farm	REF. #:	8,797
REPORT DATE:	May 11, 1994	STATION:	MW-3
DATE SAMPLED:	April 27, 1994	TIME SAMPLED:	15:40
DATE RECEIVED:	May 2, 1994	SAMPLER:	Ron Miller
ANALYSIS DATE:	May 11, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	20	BPQL
Toluene	20	2090
Ethylbenzene	20	36
m+p-Xylene	40	109
o-Xylene	20	72
Chlorobenzene	20	BPQL
1,2-Dichlorobenzene	20	BPQL
1,3-Dichlorobenzene	20	BPQL
1,4-Dichlorobenzene	20	BPQL
MTBE	20	BPQL

Surrogate % Recovery: 99 %

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-011
PROJECT NAME:	Burlington Airport Fuel Farm	REF.#:	8,797
REPORT DATE:	May 11, 1994	STATION:	Trip Blank
DATE SAMPLED:	April 27, 1994	TIME SAMPLED:	16:40
DATE RECEIVED:	May 2, 1994	SAMPLER:	Ron Miller
ANALYSIS DATE:	May 10, 11, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	4**
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).

*Note: This represents the average result of two replicate analyses.

*Note: This result was confirmed with a replicate analysis.



LABORATORY ANALYSIS

CLIENT NAME: GroundWater of Vermont MAV CONTROL #: 8797
ADDRESS: One Mill St. Box C-5 DATE OF SAMPLE: 5/2/94
Burlington, VT 05401 DATE OF REPORT: 5/16/94
ATTN: Ron Miller SAMPLER: Ron Miller
SAMPLE LOCATION: Burlington Airport Fuel Farm PROJECT NUMBER: V94-011

EXAMINATION REQUESTED:

Test - Total Petroleum Hydrocarbons. EPA 418.1

SPECIMENS:

(4) Liter glass jars containing water samples Labeled MW3, Trip.

FINDINGS:

	Trip	MW -3	Units	PQL
TPH	BPQL	37.3	mg / L	0.5

Reviewed by:

Kenneth Somerville
Head Chemist, Chemical Services



The Chace Mill, One Mill Street, Box C-5, Burlington, Vermont, 05401
(802)-860-6065 (802)-860-6076 Fax

CHAIN OF CUSTODY RECORD

LABORATORY

ANALYSIS STATUS:

 RUSH (2-DAY)

 PRIORITY (4-DAY)

_____ BEST AVAILABLE TIME

PROJECT NUMBER: V94-011

PROJECT NAME: BURLINGTON AIRPORT FUEL FARM

PROJECT LOCATION: S. BURLINGTON, VT

PROJECT MANAGER: Pon m. Hec

COLLECTED BY: Rea Miller

DATE: 4/27/94

ANALYSIS REQUESTED

METALS - PLEASE LIST: NA () EPYOX () (B)

OIL & GREASE: IR () GRAY, ()

VOLATILE ORGANICS: 624 () 601 () 602

2010 () 2013 () 2020 ▲ MTR

EXTRACTABLES: ACIDS () B-N () 500- ()

PESTS () 609,50

ES () TOS () PH () SPEC CONO ()

BACTERIA: SPC () TOT COL () FEC COL ()

CYANIDE- AMEN () TUT ()

CL () F () : 504 ()

THE METALS

SEMINOLATILES () HERBICIDES ()

OTHER: / P176y 418.1

OTHER: Refractive I.D.

RE 8

MA 27

9
RK

76

PAGE OF

8797

REMARKS

RELINQUISHED BY	DATE	TIME	RECEIVED BY
<i>Ron [Signature]</i>	5/2/91	7:45	<i>[Signature]</i>